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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TIEYU ZHENG

Appeal 2009-011236
Application 10/805,824
Technology Center 2800

Decided: March 29, 2010

Before JOSEPH F. RUGGIERO, MARC S. HOFF, and
BRADLEY W. BAUMEISTER, *Administrative Patent Judges*.

BAUMEISTER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) from the Examiner's final rejection of claims 25, 26, 28, 29, 31-34, and 36-47 (Br. 3).¹ Claims 1-24, 27, 30, and 35 have been canceled (*id.*). We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

Pursuant to our authority under 37 C.F.R. § 41.50(b), we enter new grounds of rejection as to claim 25.

Appellant's invention relates to laser light sources for intermediate or long range optical communication that are disposed in cooled transmitter modules (Spec. 2). More specifically, Appellant's invention is an improved laser module configuration that provides for a cooling element such as found in conventional "butterfly can" modules, while simultaneously achieving a packaging footprint that is relatively smaller than was historically achievable with the butterfly can (*id.*).

¹ Appellant and the Examiner both state that only claims 25, 26, 29, 33, 34, and 42-45 are rejected (Br. 5, 6; Ans. 3). However, contrary to the Examiner's assertion that "[A]ppellant did not present the rejection of claims 32, 36, 46 and 47 for review or further prosecution" (see Miscellaneous Communication to Appellant mailed Feb. 11, 2009), Appellant does alternatively state that claims 25, 26, 28, 29, 31-34, and 36-47 stand finally rejected (Br. 3), that all of these claims are the subject of the present appeal (*id.*), and that the "rejection of Claims 25, 26, 28, 29, 31-34, and 36-47... cannot be sustained" (Br. 15). As such, we understand Appellant to be appealing the rejection of all of claims 25, 26, 28, 29, 31-34, and 36-47.

Independent claim 25 is representative,² reading as follows:

25. An optoelectronic module comprising:

a substrate defining a stepped upper surface having a lower and an upper portion, the substrate being configured such that a lower surface thereof determines a footprint of the module;

a thermo-electric cooler disposed on the substrate and having a top portion including a flat top surface, the flat top surface making an entire top surface of the top portion and being substantially parallel to the lower surface of the substrate, the thermo-electric cooler further being disposed on the lower portion of the stepped surface;

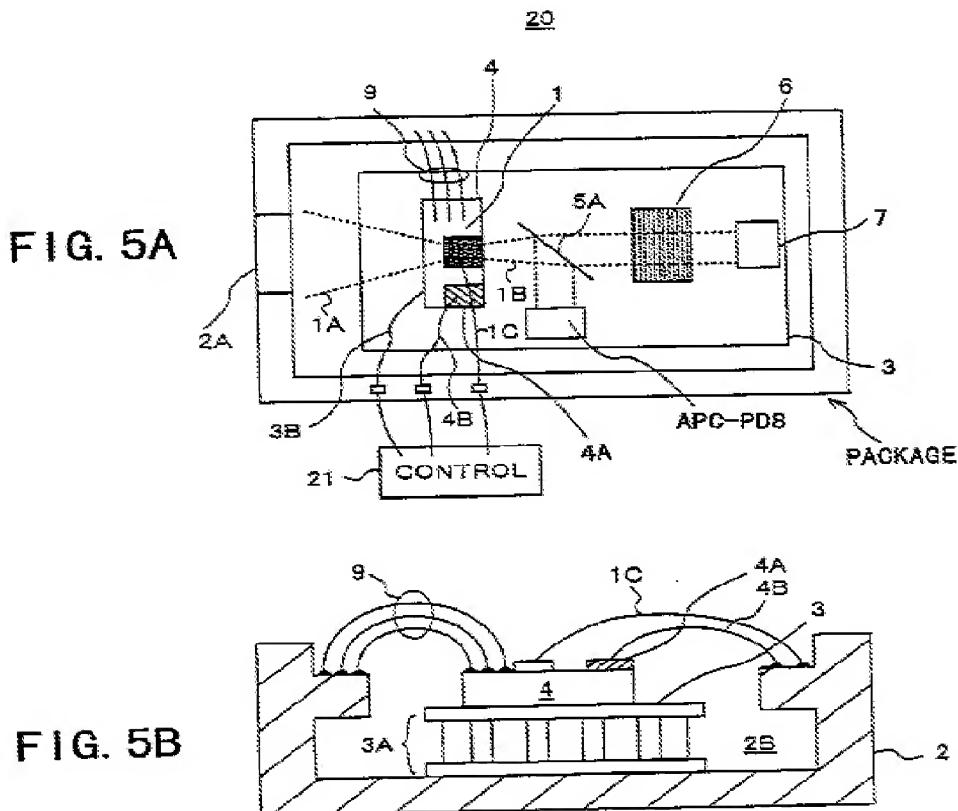
a laser light source disposed on the flat top surface of the top portion of the thermo-electric cooler such that the thermo-electric cooler is disposed between the substrate and the laser light source, wherein the thermo-electric cooler is further thermally coupled to the laser light source to cool the laser light source;

an electrical connection extending from the upper portion of the upper surface of the substrate to the laser light source; and

a laser light control device disposed on the upper portion of the stepped surface of the substrate, the electrical connection electrically coupling the laser light control device to the laser light source.

² Appellant argues claims 25, 26, 28, 29, 31-34, and 36-47 together as a group. *See Br. 6-15.* Accordingly, we select independent claim 25 as representative. *See 37 C.F.R. § 41.37(c)(1)(vii).*

Claims 25, 26, 28, 29, 31-34, and 36-47 stand rejected under 35 U.S.C. § 103(a) as obvious over Yamauchi (US 2001/0033592 A1, published Oct. 25, 2001) in view of Malone (US 6,888,169 B2, filed Oct. 1, 2001) and Zbinden³ (US 6,747,820 B2, published June 8, 2004).⁴ Yamauchi's laser module (2) is illustrated in Figures 5A and 5B.



Figures 5A and 5B depict top and side views of a laser module 20 that includes a package body 2 and an external laser control circuit 21. Package body 2 supports laser 1, thermister 4A, carrier member 4, and

³ See Ans. 3:27-28 (indicating that the obviousness rejection is based upon Zbinden as well).

⁴ Rather than repeat Appellant's or the Examiner's positions in full, we refer to the following documents for their respective details: (1) Appeal Brief ("Br.") filed September 23, 2008; and (2) the Examiner's Answer ("Ans.") mailed December 24, 2008.

Peltier temperature regulation block 3. Package body 2 further includes an internal sidewall ridge supporting bonding wire terminals that electrically couple the control circuit 21 to the laser light source 1.

The Examiner finds that (1) Yamauchi discloses all of the limitations of independent claim 25 except for “placing the laser light control device inside the laser package;” (2) Malone teaches placing a laser driver inside an optical package; and (3) Zbinden teaches more generally that integrated circuits may be placed inside an optical module adjacent to an opto-electronic component (Ans. 3). The Examiner further takes Official Notice that “it is [sic: was] well know[n] that longer wires introduce noise and instability into [a laser module] system” (*id.*). Based upon these findings and noticed fact, the Examiner concludes that it would have been obvious to incorporate Malone’s teachings “by placing the laser driver on the upper surface of the substrate in order to position the driver closer to the laser and reduce noise associated with long wires” (Ans. 3-4). That is, the Examiner concludes that it would have been obvious to have alternatively disposed Yamauchi’s laser drive circuit 21 on the laser package body’s internal sidewall ridge that supports the bonding wire terminals.

Appellant does not challenge whether longer wires introduce noise and instability into a laser module system (*see* Br. 6-15). Rather, Appellant contends that (1) “the Examiner has improperly relied on a common knowledge without considering the subject matter of the cited references as a whole” (Br. 14); (2) “[t]he proposed modification of Yamauchi would render Yamauchi unsatisfactory for its intended purpose” (Br. 7); and (3) “[t]he Examiner’s arguments in support of the proposed modification are flawed” (Br. 11). More specifically, Appellant contends that “Yamauchi does not

indicate any concern on signal integrity of connections between control circuit 21 and components of optical module” (Br. 14). Rather, Yamauchi is concerned with heat, and “one of ordinary skill in the art, based on common knowledge as well as teachings in Yamauchi, would appreciate that placing heat-generating control circuit 21 inside optical module would render Yamauchi unsatisfactory for its intended purpose” (Br. 14). This is because “[t]he purpose of Yamauchi is to overcome an erroneous operation of a known wavelength locker,” which is “a temperature regulation mechanism for maintaining the desired oscillation wavelength of the output beam of an optical module” (Br. 8). Yamauchi attempts to solve the erroneous wavelength locker by balancing any temperature differences within the laser module and by thermally coupling the laser to the environment outside the module (Br. 9). Modifying Yamauchi to include control circuit 21 inside package body 2 would render Yamauchi unsatisfactory for its intended purpose because “[i]t is well known that circuits generate heat” (Br. 10) and Yamauchi’s “bonding wires 9 are incapable of addressing the additional temperature disturbances caused by the heat generated by control circuit 21 within the optical module 20” (Br. 10-11).

Appellant further contends that Malone does not concern solving issues relating to erroneous wavelength lockers or heat transfer from the optical module’s environment (Br. 14). “Nor does Malone suggest placing electrical components closely to avoid introducing noise and instability to the optoelectronic system” (*id.*).

The Examiner, in turn, does not dispute that (1) Yamauchi is concerned with heat-induced wavelength locker errors; (2) that Yamauchi’s

laser control circuit 21 will produce heat; or (3) that Malone does not address heat or noise issues. Rather, the Examiner provides various rationales for why the heat from the control circuit – when alternatively disposed internally to the package – would not be problematic or could otherwise be compensated for (Ans. 5-8).

ISSUE

Does the cited prior art collectively teach or suggest Yamauchi's laser control circuit 21 may be alternatively provided within the laser package body so as to be specifically disposed upon the surface of the internal sidewall ridge that supports the bonding wire terminals?

PRINCIPLES OF LAW

Anticipation

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros., Inc. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987).

Obviousness

To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *See In re Royka*, 490 F.2d 981, 985 (CCPA 1974). In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073 (Fed. Cir. 1988).

“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR Int’l. Co. v. Teleflex, Inc.*, 550 U.S. 398, 416 (2007). However, “a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR*, at 418. “[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” *Id.* “A factfinder should be aware . . . of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” *Id.* at 421. Any judgment on obvious that is based on knowledge gleaned solely from Appellant’s disclosure is improper. *In re McLaughlin*, 443 F.2d 1392, 1395, (CCPA 1971).

ANALYSIS

I.

Appellant and the Examiner appear to agree on the following points: (1) Yamauchi addresses erroneous wavelength locker operation that results from uneven heating within Yamauchi’s laser module; (2) Yamauchi does not teach or suggest positioning the laser control circuit anywhere within the laser package body 2; and (3) while Malone states that laser drivers may be placed within laser modules (e.g., col. 9, ll. 4-14), Malone does not indicate that module heating is a concern for the specific laser modules discussed therein, much less disclose including cooling elements or wavelength lockers to address laser-module-heating issues. Appellant and the Examiner

also appear to agree that Yamauchi's laser control circuit 21 will produce some degree of heat, and although the parties disagree as to exactly how much additional heat will be generated (Br. 7-15; Ans. 5-8), the Examiner does acknowledge that the amount of heat may be sufficient to require including an additional cooling element (Ans. 5).

Accordingly, the agreed upon facts are sufficient to persuade us that the cited prior art does not teach or suggest alternatively providing Yamauchi's laser control circuit 21 within the laser package body. The Examiner has not provided any evidence to support the conclusion that reducing the length of the wiring that interconnects Yamauchi's laser control circuit to the laser would decrease noise or instability to any significant degree. The Examiner has not provided any evidence that the heat produced by the laser control circuit would either be negligible or at least be so insignificant as to be able to be compensated for by additional cooling elements. *A fortiori* then, the Examiner has not provided any evidence that one skilled in the art, being concerned about heat generated within Yamauchi's laser module, would have found it obvious that moving the laser control circuit inside of the package would produce benefits relating to reduced noise and stability that counterbalance or outweigh the drawbacks relating to increased heat generation.

II.

Even if we were to accept the Examiner's broader position that it would have been obvious to position Yamauchi's laser control circuit somewhere within the laser module, the Examiner still fails to further

establish why one of ordinary skill would have disposed the control circuit specifically upon an “upper portion of the stepped surface of the substrate,” as required by claim 25. That is, the prior art of record provides no teaching or suggestion to dispose the control circuit specifically upon the surface of the laser package body’s internal sidewall ridge that supports the bonding wire terminals.

We see no evidence that Yamauchi envisioned the upper surface of the package body’s internal sidewall ridge serving any function other than supporting the bonding wire terminals. Also, the record contains no alleged basis or evidence that the laser control circuit is small enough to fit upon this ridge, nor that the relative widths of the ridge and control circuit could be adequately modified to accommodate the control circuit upon the ridge. Rather, assuming *arguendo* that the components depicted in Figures 5A and 5B are drawn at least somewhat to scale, the various component sizes would then be the only factor in the record that may potentially indicate where the control circuit could be placed. Moreover, these components’ respective sizes would more likely lead one to place the control circuit somewhere other than the ridge. That is, the various components’ relative sizes would more likely lead one to alternatively dispose the control circuit upon either the significantly larger thermoelectric cooler (TEC) 3, or at least upon the carrier member 4 which is interposed between the TEC and the laser 1.

Alternatively positioning the laser control circuit either (1) on the carrier between the laser 1 and thermister 4a, or (2) directly on the TEC, would also be more consistent with the Examiner’s asserted rationale of “plac[ing] the electrical components as close together as possible” (Ans.

3:25-26). Bonding wires 1C, 4B, and 3B respectively interconnect the control circuit 21 to the laser 1, the thermister 4A, and the TEC 3 (Figs. 5A and 5B). As such, positioning the controller on the carrier adjacent the laser and thermistor, or at least directly on the TEC, would enable the use of even shorter bonding wires than would be possible if the controller were positioned on the more distant package body sidewall ridge.

Viewing the evidence as a whole, we conclude the Examiner's finding – that the package body's internal sidewall ridge would be an obvious alternative location to place the laser control circuit – resulted from using Appellant's disclosure as a roadmap. This type of hindsight reasoning is improper. *McLaughlin*, 443 F.2d at 1395.

For the foregoing reasons, Appellant has persuaded us of error in the Examiner's obviousness rejection of representative claim 25. Accordingly, we will reverse the Examiner's rejection of that claim, and dependent claims 26, 28, 29, 31-34, and 36-47 which fall with claim 25.

NEW GROUNDS OF REJECTION

Pursuant to our authority under 37 C.F.R. § 41.50(b), we reject claim 25 under 35 U.S.C. 102(e) as anticipated by U.S. Patent # 7,103,284 B2, issued to Oomori et al. September, 5, 2006.

FINDINGS OF FACT

The record supports the following Findings of Fact by a preponderance of the evidence:

Oomori

1. Oomori discloses a light emitting module (Abstract). The module's housing 4 contains a Peltier element 24, a light emitting device 30 such as a laser diode, and a laser driver 42 (col. 3, ll. 1-45; Figs. 1-3). The lower surface of housing 4 substantially coincides with the entire width and length of the housing (Figs. 1-3).
2. Peltier element 24 is disposed on housing 4 by means of substrate 22 (col. 3, ll. 23-30; Figs 1-3). Peltier element 24 has a top portion including a flat top surface, the flat top surface making an entire top surface of the top portion and being substantially parallel to the lower surface of the housing 4 (Figs 1-3).
3. Laser diode 30, in combination with container 26 and chip carrier 28, is disposed on the flat top surface of the top portion of Peltier element 24 (col. 3, ll. 23-30; Figs 1-3). "The Peltier element 24 adjusts a temperature of a light-emitting device mounted thereon" (col. 3, ll. 25-27).
4. "The first sub-assembly comprises an auxiliary member 38, a first wiring plate 40 on the auxiliary member 38, and a laser driver 42" (col. 3, ll. 43-45). The auxiliary member 38 is disposed on the interior surface of housing 4 (Fig. 3).
5. "Lead terminals (4c, 4d) are arranged at respective sides of the body 4a [that encases all of the sub-assemblies] and electrically connected to the first sub-assembly 6, the second subs-assembly 8, and the third sub-assembly 10" (col. 3, ll. 16-19). "The laser driver 42 receives a signal from the lead terminal 4d [sic: 4c?] through bonding wires 44 and sends a driving signal to the laser diode 30 through wires 46" (col. 3, ll. 48-50; Fig. 3).

ANALYSIS

Claim 25 recites “a substrate defining a stepped upper surface having a lower and an upper portion, the substrate being configured such that a lower surface thereof determines a footprint of the [optoelectronic] module.” Oomori discloses a housing 4 for a light emitting (or “optoelectronic”) module, and an auxiliary member 38 disposed on the interior surface of housing 4 (Facts 1, 4). The claimed substrate, then, reads on the combination of housing 4 and auxiliary member 38. More specifically, the claimed lower portion of the substrate reads on the portion of the housing 4 upon which the Peltier element 24 is disposed (*see Fact 2*), and the claimed upper portion reads on the upper surface of auxiliary member 38. The lower surface of housing 4 substantially coincides with the entire width and length of the housing (Fact 1) and may, therefore, be deemed to “determine[s] a footprint of the module” as required by the claim language.

Oomori’s Peltier device (or “thermoelectric cooler”) is disposed on the housing (or “substrate”) and has a top portion including a flat top surface, the flat top surface making an entire top surface of the top portion and being substantially parallel to the lower surface of the substrate (Fact 2). The Peltier device is further thermally coupled to the laser light source 30 to cool the laser (Fact 3).

Oomori’s laser driver 42 may be deemed to be synonymous with the “laser light control device” as recited in claim 25 (*see Fact 5*). This laser driver is disposed on the auxiliary member 38 (Fact 4). That is, the laser driver is disposed on the claimed “upper portion of the stepped surface of the

substrate.” Also, a lead terminal, or “electrical connection,” extends from the upper surface of the substrate to the laser light source, electrically coupling the laser driver 42 (or “laser light control device”) to the laser light source 30 (Fact 5).

For at least the foregoing reasons, then, Oomori anticipates claim 25. Because the Board of Patent Appeals and Interferences is a review body, rather than a place of initial examination, we have not reviewed dependent claims 26, 28, 29, 31-34, and 36-47 to the extent necessary to determine whether Oomori renders any of these claims unpatentable as well. We leave it to the Examiner to determine the appropriateness of any further rejections under 35 U.S.C. §§ 102 and 103.

DECISION

- (1) The Examiner’s decision rejecting claims 25, 26, 28, 29, 31-34, and 36-47 is reversed.
- (2) Pursuant to our authority under 37 C.F.R. § 41.50(b), we enter new grounds of rejection for claim 25 under 35 U.S.C. § 102(e).
- (3) Since we have entered new grounds of rejection, our decision is not a final agency action.

FINALITY OF DECISION

This decision contains new grounds of rejection pursuant to 37 C.F.R. § 41.50(b) (2007). This regulation states that “[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review.”

Furthermore, 37 C.F.R. § 41.50(b) also provides that Appellant, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new grounds of rejection to avoid termination of the appeal as to the rejected claims:

- (1) *Reopen prosecution.* Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner. . . .
- (2) *Request rehearing.* Request that the proceeding be reheard under § 41.52 by the Board upon the same record. . . .

Should Appellant elect to prosecute further before the Examiner pursuant to 37 C.F.R. § 41.50(b)(1), in order to preserve the right to seek review under 35 U.S.C. §§ 141 or 145 with respect to the affirmed rejection, the effective date of the affirmance is deferred until conclusion of the prosecution before the Examiner unless, as a mere incident to the limited prosecution, the affirmed rejection is overcome.

If Appellant elects prosecution before the Examiner and this does not result in allowance of the application, abandonment or a second appeal, this case should be returned to the Board of Patent Appeals and Interferences for final action on the affirmed rejection, including any timely request for rehearing thereof.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2007).

Appeal 2009-011236
Application 10/805,824

REVERSED
37 C.F.R. § 41.50(b)

gvw

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